

A11 In July 1994, the Government announced that as many as 12 digital terrestrial television services might be available using Channel 35 as a Single Frequency Network providing four services to more than 95 per cent of the population, and eight other services from interleaved frequency channels allowing regional variations to around 80 per cent of the population. Without using Channel 35, the ITC now hopes to identify six interleaved frequency channels giving substantial national coverage, each capable of providing three programme services of excellent picture quality. Two channels might in the medium term be available to over 90 per cent of the population, two to over 80 per cent and two to between 60 and 70 per cent. These later ITC figures are for higher picture quality – 6 Mbits/s as opposed to 5 Mbits/s per service – within frequency channels of approximately 18–20 Mbits/s. More channels may become available with more local coverage. The use of Channel 35 remains an additional option, but more work remains to be done on the implications of using Channel 35 for the technical standards (and cost) of receivers.

A12 A considerable effort is required to map digital television services into the frequency channels available between existing analogue services, and to assess the extent of any interference with video recorders or other equipment. This work is coordinated in the UK by the Radiocommunications Agency, which is also responsible for seeking international approval for UK digital frequency plans. It is intended to establish a reasonably stable frequency plan early in 1996.

Frequency availability – radio

A13 There is no space available within the existing analogue FM band to introduce DAB. To allow DAB to begin and subject to certain international constraints, the Government has therefore made available some 12.5 MHz of spectrum outside the existing sound broadcasting allocation.

A14 The seven frequency channels available will each be able to carry six stereo or a greater number of mono services. Four frequency channels are needed to allow at least one local DAB multiplex to be available to every area of the country. Two further channels have been allocated to provide two national multiplexes. The remaining channel could be used to provide extra local services where demand is greatest, or to provide a further quasi-national service, with limitations on coverage.

Additional services

A15 The bit rate required for data services is considerably less than that required for television, so a considerable amount of information can be transmitted without adversely affecting television picture quality on the same frequency channel. There are two ways in which the transmission of data services can be organised within a digital frequency channel used for television transmission. A small part of the bit stream capacity can be allocated exclusively to data and kept clear of the television signal. This would be necessary for the transmission of conditional access information and of subtitling, which must reach the receiver simultaneously with the picture and sound to which it refers. Alternatively, data capacity can be greatly increased by making use of 'picture redundancy' *within* the part of the bit stream allocated to television. When the picture contains high levels of detail and motion, a high bit rate is required. However, when the picture is less complex, a large part of the bit rate

allocated to television transmission will be redundant and can be temporarily switched to data services until it is required again for the television signal. As the availability of this additional capacity is dependent upon the picture content and changes therein, it is not suitable for applications which require 'real-time' distribution. However, most data applications will not require that. There may also be scope for additional services on DAB frequencies, though there is no equivalent for radio of picture redundancy.

International standards

A16 Technical work on digital television standards within Europe is being taken forward by the Digital Video Broadcasting (DVB) Group. The Group is supported by the European Commission and consists of over 140 manufacturers, broadcasters and regulatory organisations. Its work is at an advanced stage, with standards for digital cable and satellite television transmission available now. European Standards for digital terrestrial television are expected to be finalised by early 1996.

A17 One issue remains to be resolved. A choice of standard needs to be made for terrestrial digital television between a system where the digital signal is spread across 8000 carriers within the frequency channel or one where 2000 carriers are used. An 8000 carrier system would be able to support wide-area Single Frequency Networks (SFNs), possibly on a national scale. A 2000 carrier system would require an interleaved system of a number of different frequencies to achieve national coverage. A Single Frequency Network allows very efficient use of the spectrum, but interleaved systems using 2000 carriers could be introduced faster and would allow for cheaper receivers. In addition, there is scope, even with 2000 carriers, for many relays to operate on the same frequency as main transmitting stations, increasing the coverage of the signal. This will enhance the efficiency of interleaved networks.

A18 For radio, the EUREKA 147 Digital Audio Broadcasting System was developed in Europe and standardised by the European Telecommunications Standards Institute in December 1994. In June 1995 it was approved as a world standard.

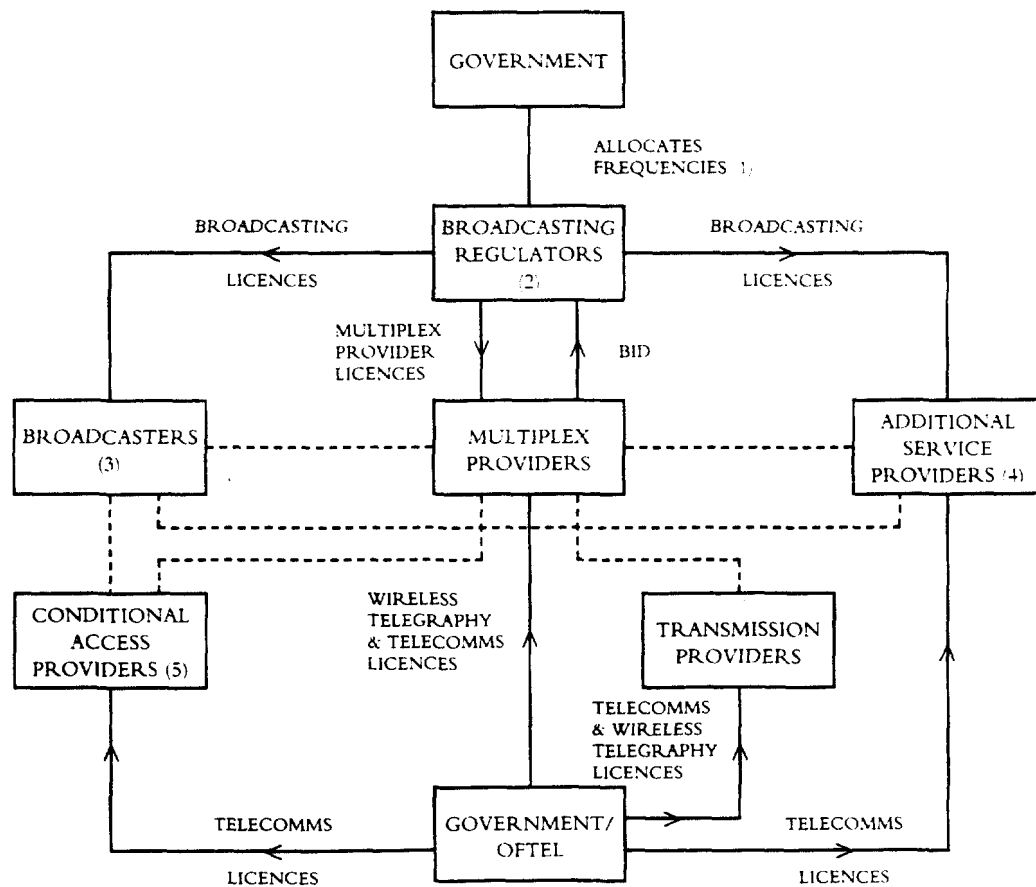
Annexe B

Chart of relationships under the proposed framework

Notes:

1. Frequencies for the BBC and S4C are allocated direct.
2. Independent Television Commission and Radio Authority.
3. BBC operates services under the terms of its Charter and Agreement.
4. Additional service providers may contract with multiplex providers, broadcasters, or both.
5. Conditional access providers may contract with broadcasters, multiplex providers, or both.

Key: > = Licensing. - - - - = Contractual arrangements.



Glossary

The following definitions reflect usage in this document.

Additional services	additional data and communication services carried on capacity within frequency channels predominantly used for television or radio.
Analogue	the system currently used for transmitting television and radio signals, in which a radio frequency is modulated in a manner analogous to the variations in picture or sound.
Bit	binary digit, the smallest unit of computer information, expressed as a 1 or a 0.
Bit rate	the rate of flow per second of binary digits in a digital transmission system.
Bit stream	a stream of binary digits which makes up the total bit rate available within a frequency channel.
Broadcaster	organisation supplying, or commissioning from independent producers, a radio or television service for transmission.
Cable broadcasting	transmission method whereby the signal enters the consumer's home via a cable, usually laid underground.
Carrier wave	an individual wave used in transmission, which is modulated to carry sound, picture or other information.
Conditional access system	method, usually combining technical and subscription management operations, for managing access to broadcast services by controlling the descrambling of signals in consumers' receivers. The system allows an operator to 'enable' receivers which are valid for a particular service (eg, where subscriptions have been paid) and to disable those which are not (eg, where subscriptions have not been paid).
Coverage	geographical area within which a broadcast signal is receivable to a specified standard and within which the necessary transmission infrastructure for its reception by those with the appropriate receiver is present.

Digital broadcasting	transmission system using technology whereby sounds and pictures for broadcast are processed electronically and converted into binary digits. The system is suitable for terrestrial, satellite and cable transmission.
Digital compression	electronic technique for reducing the number of binary digits necessary to convey information. In broadcasting, this reduces the amount of information which needs to be transmitted in order to provide acceptable sound and picture quality.
Domestic satellite broadcaster	a satellite television broadcaster transmitting, for reception in the UK only, on a frequency allocated specifically to the UK by international agreement. There are currently no such broadcasters.
Encryption	method whereby the messages needed to descramble a broadcast signal are made secret so that they can be received only by those consumers fulfilling the conditions for access, usually through payment of a fee.
Free to air	television or radio services funded from the TV licence fee or advertising, with no further charge to the viewer or listener.
Frequency channel	area on the electromagnetic spectrum used for transmission of broadcast services. Analogue transmission allows one programme service per frequency channel. Digital compression and transmission allows a single frequency channel to carry several programme services.
Headend	centre from which a cable operator relays broadcasts and conditional access information via cables to viewers' receivers.
Interactive broadcasting	broadcast service allowing viewer or listener to respond individually to questions or choices put to him or her through the television or radio service.
Interleaved frequency network	transmission network whereby the signal is transmitted on different frequencies in different geographical areas within the network's coverage, to avoid interference.
Modulation	way in which carrier waves are varied either in frequency, amplitude and/or phase in order to transmit sound, picture or other information.

Multiplex	the combination of several programme services, and possibly additional services, within a frequency channel.
Multiplex provider	provider of the above facility, who under the Government's proposals will be licensed by the ITC/Radio Authority to make use of a frequency channel.
Non-domestic satellite broadcaster	a satellite television broadcaster transmitting for reception in the UK and/or in other countries, via an uplink situated in the UK and on a frequency <i>not</i> allocated specifically to the UK.
Pay-TV	any television service made available to the viewer, usually through a conditional access system, in return for direct payment.
Pay-per-view TV	television service made available to the viewer through a conditional access system at a charge calculated on the basis of the programmes watched.
Picture redundancy	that part of the bit rate which is not required to transmit the picture on screen at a given moment.
Public service broadcasting	broadcasting services funded from TV Licence fees or awarded licences by the regulator on the basis of positive programming, as well as financial, criteria. Includes all current terrestrial television services and the BBC's radio services.
Satellite broadcasting	transmission system whereby sound and pictures are beamed from an orbiting satellite, for capture by a fixed aerial, usually parabolic.
Simulcasting	simultaneous transmission of a programme in analogue and in digital form.
Single frequency network	transmission network in which the signal is transmitted on the same frequency from each transmitter throughout the coverage.
Subscription TV	broadcast service made available to the consumer through a conditional access system in return for a regular, usually monthly, payment.
Terrestrial broadcasting	sound and pictures transmitted through the earth's atmosphere using ground-based networks of transmitters and masts.
Transmission operator	organisation providing transmission facilities for broadcasters or multiplex providers.

Uplink

transmission from Earth to satellite of a television or radio signal, which is then relayed from the satellite to viewers' and listeners' receivers.

Widescreen television

transmission and reception format providing viewers equipped with appropriate receivers with a wide screen image, in dimensions proportional to 16 by 9.